WHAT IS CLAIMED IS:

1. A receiver for demodulating received impulse radio signals that are modulated according to a one-of-two positions modulation scheme, the receiver comprising:

an adjustable precision timing generator producing a first timing signal and a second timing signal separated in time from one another by more than ½ the width of impulses of the received impulse radio signal;

a first sampler triggered to sample the received impulse radio signal in accordance with said first timing signal and to provide a first sampler output;

a second sampler triggered to sample the received impulse radio signal in accordance with said second timing signal and to provide a second sampler output; and

a data detector to produce a demodulation decision based on the first sampler output and the second sampler output.

2. The receiver of claim 1, wherein the received impulse radio signal includes an impulse that is located in one of a first possible position and a second possible position within a time frame of the received impulse radio signal.

3. The receiver of claim 2, wherein said first timing signal corresponds to said first possible position and said second timing signal corresponds to said second possible position.

4. The receiver of claim 3, wherein said first possible position is separated from said second possible position by a distance that is at least 10 times the width of impulses of the received impulse radio signal, and wherein said first timing signal and said second timing signal are separated in time by said distance.

5. The receiver of claim 4, wherein the width of the impulses of the received impulse radio signal are approximately 0.5 nsec and said distance is at least 5.0 nsec.

6. A method for demodulating received impulse radio signals that are modulated according to a one-of-two positions modulation scheme, comprising the steps of:

producing a first timing signal and a second timing signal separated in time from one another by more than ½ the width of impulses of the received impulse radio signal;

sampling the received impulse radio signal in accordance with said first timing signal to provide a first sampler output;

sampling the received impulse radio signal in accordance with said second timing signal to provide a second sampler output; and

producing a demodulation decision based on the first sampler output and the second sampler output.

7. The method of claim 6, wherein the received impulse radio signal includes an impulse that is located in one of a first possible position and a second possible position within a time frame of the received impulse radio signal.

8. The method of claim 7, wherein said first timing signal output corresponds to said first possible position and said second timing signal output corresponds to said second possible position.

9. The method of claim 8, wherein said first possible position is separated from said second possible position by a distance that is at least 10 times the width of impulses of the received impulse radio signal, and wherein said first timing signal and said second timing signal are separated in time by said distance.

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10. The method of claim 9, wherein the width of the impulses of the received impulse radio signal are approximately 0.5 nsec and said distance is at least 5.0 nsec.

11. A receiver for demodulating a received impulse radio signal that is modulated according to a one-of-N positions modulation scheme, where N is the number of different possible positions where an impulse can be located within each time frame of the impulse radio signal, the receiver comprising:

a timing generator to generating N timing signals per each time frame of the received impulse radio signal, wherein each of said N timing signals is separated in time by more than ½ the width of impulses of the received impulse radio signal;

one or more samplers triggered to sample the received impulse radio signal in accordance with said N timing signals and to provide a first to Nth sampler outputs; and

a data detector to produce a demodulation decisions based on said first to Nth sampler outputs.

12. The receiver of claim 11, wherein the received impulse radio signal includes impulses that are located in one of a first to Nth possible positions within a time frame of the received impulse radio signal.

13. The receiver of claim 12, wherein said first to Nth timing signals corresponds said first to said first to Nth possible positions, respectively.

14. The receiver of claim 13, wherein each of the N possible positions are separated from one another by at least 10 times the width of impulses of the received impulse radio signal, and wherein said first to Nth timing signal are separated in time by the same distances that said first to Nth possible positions are separated.

15. The receiver of claim 14, wherein the width of the impulses of the received impulse radio signal are approximately 0.5 nsec, and wherein each of the N possible positions are separated from one another by at least 5.0 nsec.

16. A method for demodulating a received impulse radio signal that is modulated according to a one-of-N positions modulation scheme, where N is the number of different possible positions where an impulse can be located within each time frame of the impulse radio signal, comprising the steps of:

producing N timing signals per each time frame of the received impulse radio signal, wherein each of said N timing signals is separated in time by more than ½ the width of received impulses of the received impulse radio signal;

sampling the received impulse radio signal in accordance with said N timing outputs and to provide a first to Nth sampler outputs; and

producing a demodulation decisions based on the first to Nth sampler outputs.

17. The method of claim 16, wherein the received impulse radio signal includes an impulse that is located in one of a first to Nth possible positions within a time frame of the received impulse radio signal.

18. The method of claim 17, wherein said first to Nth timing signals corresponds said first to an Nth possible positions, respectively.

19. The method of claim 18, wherein each of the N possible positions are separated from one another by at least 10 times the width of the impulses of the received impulse radio signal, and wherein said first to Nth timing signal are separated in time by the same distances that said first to Nth possible positions are separated.

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20. The method of claim 19, wherein the width of the impulses of the received impulse radio signal are approximately 0.5 nsec, and wherein each of the N possible positions are separated from one another by at least 5.0 nsec.

21. A receiver for processing a received impulse radio signal that is modulated according to a one-of-N positions modulation scheme, where N is the number of different positions where an impulse can be located within each time frame of the impulse radio signal, the receiver comprising:

an adjustable precision timing generator to produce N timing signals per time frame of the received impulse radio signal, wherein each of said N timing signals is separated in time from one another by more than ½ the width of impulses of the received impulse radio signal;

a data correlator to sample the received impulse radio signal in accordance with said N timing signals and to provide a first sampler output through an Nth sampler output;

a threshold comparitor to compare each of said first sampler output through said Nth sampler output to a threshold, and to output a threshold trigger signal when said threshold is exceeded;

a data sample and hold (S/H) to sample at least one of said first sampler output through said Nth sampler output in response to said threshold trigger signal, and to output at least one corresponding sample value that exceeds said threshold;

a counter to increment a count value in response to receiving each of said N timing outputs, and to reset every N timing outputs;

a latch to store said count value in response to said threshold trigger signal; and

a data detector to produce a demodulation decision based on at least said count value received from said latch and said corresponding sample value.

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22. The receiver of claim 21, wherein the received impulse radio signal includes an impulse that is located in one of a first to Nth possible positions within a time frame of the received impulse radio signal.

23. The receiver of claim 22, wherein said first to Nth timing signals corresponds said first to Nth possible positions, respectively.

24. The receiver of claim 23, wherein each of the N possible positions are separated from one another by at least 10 times the width of impulses of the received impulse radio signal, and wherein said first to Nth timing signal are separated in time by the same distances that said first to Nth possible positions are separated.

25. The receiver of claim 24, wherein the width of the impulses of the received impulse radio signal are approximately 0.5 nsec, and wherein each of the N possible positions are separated from one another by at least 5.0 nsec.

26. A method for processing a received impulse radio signal that is modulated according to a one-of-N positions modulation scheme, where N is the number of different positions where an impulse can be located within each time frame of the impulse radio signal, comprising the steps of:

sampling the received impulse radio signal at each of N possible positions where an impulse can be located within each time frame of the received impulse radio signal to produce a first sampler output through an Nth sampler output;

comparing each of said first sampler output through said Nth sampler output to a threshold;

producing a threshold trigger signal whenever said threshold is exceeded;

sampling at least one of said first sampler output through said Nth sampler output in response to said threshold trigger signal to produce at least one corresponding sample value that exceeds said threshold;

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incrementing a count value in response to receiving each of said N timing outputs, wherein said count value is reset every N timing outputs;

storing said count value in response to said threshold trigger signal; and

producing a demodulation decision based on at least said count value and said corresponding sample value.

27. The method of claim 26, wherein the received impulse radio signal includes an impulse that is located in one of a first to Nth possible positions.

28. The method of claim 27, wherein each of the N possible positions are separated from one another by at least 10 times the width of impulses of the received impulse radio signal.

29. The method of claim 28, wherein the width of impulses of the received impulse radio signal are approximately 0.5 nsec, and wherein each of the N possible positions are separated from one another by at least 5.0 nsec.

30. The method of claim 26, wherein the width of impulses of the received impulse radio signal are approximately 0.5 nsec, and wherein each of the N possible positions are separated from one another by at least 5.0 nsec.

31. A method for making demodulation decisions based on a received impulse radio signal that has been modulated according to a one-of-N positions modulation scheme, where N is the number of possible positions where an impulse can be located within each time frame of the impulse radio signal, comprising the steps of:

a. receiving a plurality of training frames of an impulse radio signal wherein the position of an impulse within each frame is known;

b. sampling each training frame at the position within each time frame where the impulse is known to be located to produce training impulse samples;

c. sampling each position within each training frame that is later in time than the position where the impulse is known to be located to produce training downstream samples;

e. receiving additional frames of an impulse radio signal; and

f. producing a demodulation decision based on said additional frames and said training downstream samples.

32. The method of claim 31, wherein step f. comprises the steps of:

i. sampling each of the additional frames at each of the possible N positions where an impulse can be located to produce data samples; and

ii. producing the demodulation decision based on at least said data samples and said training downstream samples.

33. The method of claim 32, wherein step f.ii. comprises producing the demodulation decisions based also on the training impulse samples.

34. The method of claim 33, wherein step a. comprises receiving X frames where the impulse is located in a first of the N positions, X frames wherein the impulse is located in a second of the N positions ... and X frames where the impulse is located in the Nth-1 position of the N positions.

35. The method of claim 34, wherein step b. comprises producing the training impulse sample values by

sampling the first position in the X frames where the position of the impulse is located at the first position,

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sampling the second position in the X frames where the position of the impulse is located at the second position, ... and

sampling the Nth-1 position in the X frames wherein the position of the impulse is located at the Nth-1 position.

36. The method of claim 35, wherein step c. comprises producing the downstream samples by

sampling the second through Nth positions in the X frames where the impulse is located at the first position,

sampling the third through Nth positions in the X frames where the impulse is located at the second position, ... and

sampling the Nth position in the X frames where the impulse is located at the Nth-1 position.

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